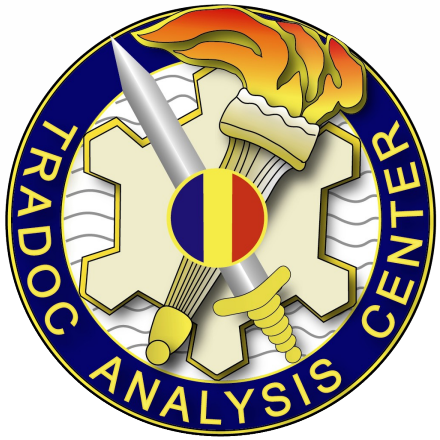
# Soldier Representation in M&S Master Plan

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# Agenda

- **Background**
- **Description of the problem**
- **Objective**
- **S-MAWG**
- **Key NPS Departments**
- **Technical Approach**
- **Milestones/Deliverables**
- **Soldier Research Categories**

# Background

- ***"Iraq and Afghanistan has showed us again that it is the caliber of soldier not the caliber of the weapon that makes the difference in the battle."***
  - **General Kevin Byrnes, TRADOC Commander**
- ***"…urban operations are a corporal and sergeant's fight."***
  - **Emerald Express 03 Summary**
- ***"Letting SOF NCOs and JOs run ad hoc fight in flat org chart …. resulted in agility, flexibility and adaptive warfare that let 80 SOFs … take down Taliban and defeat Al Qaeda on their home turf."***
  - **recorded at the 34th Annual IFPA/Fletcher School Conf.**

# Description of the Problem

- **As the Army transforms into the Future Force, more emphasis must be placed on modeling the actions, behaviors, and the information available to the Soldier.**
- **Modeling the Soldier as a System (SaaS) must address shortfalls such as how soldiers tactically react, move, coordinate, and report.**
- **This is especially important as we emphasize asymmetric, network-enabled operations.**

# Objective

- **To credibly represent the Soldier in models and simulations.**
- **Support the efforts of the U.S. Soldier Modeling and Analysis Working Group (S-MAWG).**
- **Utilize and focus military students and faculty at the Naval Postgraduate School.**

# Soldier Modeling and Analysis Working Group (S-MAWG)

- **WSMR-sponsored team evaluated numerous models and simulations to identify and prioritize deficiencies in modeling the Soldier.**
- **Categorized approximately 60 “gaps”**
  - **Situational Awareness**
  - **Lethality**
  - **Mobility**
  - **Survivability and Protection**
  - **Soldier Equipment Trustworthiness**
  - **Modeling the Physical Environment**
  - **Modeling the Mission Environment**
- **Prioritized according to critical to credible results.**

# Key NPS Departments

- **Operational and Informational Sciences**
  - **Operations Research**
  - **Computer Science**
  - **Information Science**
  - **Defense Analysis**
- **Engineering and Applied Sciences**
  - **Systems Engineering**
  - **Physics**
  - **Systems Management**
  - **Math**
- **Other Departments**
  - **Homeland Security**
  - **MOVES**

# Technical Approach

- **Phase I: define/target several sets of research topics.**
  - **Identify key faculty members and students.**
  - **Scope effort.**
  - **Priority of research areas based on S-MAWG's gap list.**
- **Phase II: guide research efforts.**
- **Phase III: consolidate and report results.**

# 1. Reactions to Indirect Fire

- **Description: There is a need to accurately model the behavior of soldiers receiving/observing indirect fire.**
- **S-MAWG Category : Situational Awareness and Survivability & Protection**
- **Factors: visual and acoustic cues, vibratory cues, distance/effects, training/experience, posture, mission, movement rates, cover search, suppression.**
- **Research Objective: Using historical and doctrinally correct actions, develop an algorithm based on training, effective area, and visual and acoustic cues to model the basic behaviors/rules of the Soldier when receiving indirect fire.**

# 2. Reactions to Direct Fire

- **Description: There is a need to model the basic behavior of soldiers involved in a firefight.**
- **S-MAWG Category : Situational Awareness, Lethality, and Survivability & Protection**
- **Factors: visual and acoustic cues, posture, threat type, target selection/queuing, commo, effects, dynamic pHs, tactical movements/battle drills, stress, suppression, *cover search*.**
- **Research Objective: Using visual and acoustic cues and threat type, model the basic behaviors/rules of the Soldier with respect to posture, target selection, and/or commo.**

# 3. Direct Fire Effects

- **Description: There is a need to represent munitions effects on dismounted soldiers. Non-fatal wounding is generally not represented.**
- **S-MAWG Category : Lethality and Survivability & Protection**
- **Factors: accuracy/variance, impact point, posture, protective gear, movement rate, dynamic pHs, suppression.**
- **Research Objective: Using the posture of a soldier, model precise, non-fatal munition effects on the Soldier.**

# 4. Soldier Accuracy Based on Time

- **Description: There is a need to represent variable lay time and accuracy of a soldier engaging targets in quick reaction and deliberate situations.**
- **S-MAWG Category : Lethality and Survivability & Protection**
- **Factors: exposure/lay time, dynamic pHs, rate of fire, accuracy/variance, posture/support, target movement rate, distance.**
- **Research Objective: Develop data/algorithms to model variable time engagements/pHs.**

# 5. Soldier Accuracy Based on Posture

- **Description: There is a need to to represent the effects of different firing positions on engagement accuracy.**
- **S-MAWG Category : Lethality and Survivability & Protection**
- **Factors: posture/support, exposure/lay time, dynamic pHs, rate of fire, accuracy/variance, target movement rate, distance.**
- **Research Objective: Develop data/algorithms to model  posture/support dependant pH/pKs.**

# 6. Individual Weapon Capabilities in MOUT

- **Description: Data does not exist for typical urban engagements of less than 50 meters.**
- **S-MAWG Category : Lethality**
- **Factors: rate of fire, exposure/lay time, distance, posture/support, dynamic pHs, accuracy/variance, target queuing.**
- **Research Objective: An analysis of historical data for the M16 and M249 in recent urban conflicts (Somalia and Iraq) to yield models and data for pHs of these weapon systems.**

# 7. Soldier Load/Fatigue

- **Description: There is a need to better understand and represent other elements of the Soldier's performance that are affected by fatigue caused by the Soldier's load beyond the Soldier's speed**
- **S-MAWG Category : Mobility**
- **Factors: Weapon/gear/casualty carried, reaction/ engagement time, fatigue, tactical movement, posture, terrain.**
- **Research Objective: Using historical data, model fatigue and its effects on the soldier.**

# 8. Semantic Terrain

- **Description: Acquisition data is needed to allow entities to acquire or be cued to bunkers, fighting positions, and other ‘danger areas’**
- **S-MAWG Category : Lethality**
- **Factors: Visual and acoustic cues, threat recognition, threat location approximation, commo, line of sight, training/experience.**
- **Research Objective: Better represent the Soldier’s ability to acquire, recognize, and engage targets other than soldiers and vehicles.**

# 9. Human Factors

- **Description: There is a need to identify and represent human factor effects.**
- **S-MAWG Category : Survivability & Protection**
- **Factors: fatigue, stress, experience/training, emotion, personality, physical/cognitive resources.**
- **Research Objective: Identify and develop data/ algorithms of how different human factors such as stress effect Soldier performance.**

# 10. Cover and Concealment

- **Description: There is a need to represent how a Soldier finds and uses cover and concealment.**
- **S-MAWG Category : Modeling the Environment and Survivability & Protection**
- **Factors: posture, exposed area, material composition, dynamic pHs, weapon type.**
- **Research Objective: Develop data/algorithms how the soldier finds and uses typical objects as cover.**